

AUTHORS: 1) Tsukernik, I. V., Candidate of Technical Sciences SOV/165-55-9-17/34  
2) Groys, Ye. S.,  
3) Mel'gunov, N. M., Engineer, Chairman of the Scientific Research Institute of Direct Current

TITLE: Prospects in the Application of Direct-Current Transmission in the USSR (O perspektivakh primeneniya elektroperedach postoyannogo toka v Sovetskom Soyuze)

PERIODICAL: Elektrichestvo, 1958, Nr 9, pp 70 - 75 (USSR)

ABSTRACT: This is a comment on the article by N.M.Mel'gunov in Elektrichestvo, 1957, Nr 2. 1) The point is stressed that no consideration has been taken of the prospects offered by atomic power engineering, not even in a general form. There is, however, reason to believe that at the moment where d.c. transmission has matured as to be of importance for industry atomic energy power generation will have sufficiently developed. 2) On March 11, 1958, the General Assembly convened of the members of the Pervichnaya organizatsiya NTOEP Nauchno-issledovatel'skogo instituta postoyannogo

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toka (Sub-Section of the NTOEP at the Scientific Research Institute of Direct Current). This meeting featured a discussion of the commentaries to the article by Mel'gunov in Elektrichestvo, 1957, Nr 2. It was attended by the leading scientific collaborators of the Institute of Direct Current, representatives of the Leningradskaya laboratoriya Energeticheskogo instituta AN SSSR (Leningrad Laboratory at the Institute of Power Engineering, AS USSR) of the Leningradskiy politekhnicheskii institut (Leningrad Polytechnical Institute), of the Teploelektroproyekt, of the Gidroproyekt etc. The note presented by Mel'gunov as item 3 in this paper was read and discussed. The draft for the decision to be adopted which was prepared by N.N.Shchedrin, Ye.S.Groys, V.I.Yemel'yanov, V.M.Kvyatkovskiy, N.M.Mel'gunov and A.M.Reyder was also debated. V.M.Kvyatkovskiy, A.K.Gertsik, M.V.Kostenko, N.A.Shipulina (a woman), P.G. Sorokin, V.I.Yemel'yanov, I.F.Polovoy, Ya.S. Tatevosyan, V.V. Bolotov and N.D.Leshukov took part in the debate. The decision was approved unanimously. Its outstanding points are: D.c.transmission should be mainly applied in the transmission

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of great energies across wide distances, as such a transmission is more economical than others. D.c. transmission is the most economical as compared to railroad transportation of fuel and to other systems of power transmission, whereas an alternating current transmission is almost beaten in the competition with railroad coal transportation. D.c. transmissions operating at  $\pm 600-700$  kV will be realized in the near future and are capable of transmitting as much as 30 billion of kWh per year through one line. One kWh transmitted across a distance of about 2500 km will cost about 0,5 - 0,6 kopecks. Hence it will be possible to exploit the energy produced by the Angara-Yenissey cascade of power dams, that produced in the open-face mining area in Kazakhstan, and that produced from the non-transportable coal in the Krasnoyarsk district to supply the European part of the Union. As in the next 15 years gas production will climb to a level of 270 - 320 billion m<sup>3</sup> per annum it will partly be available for the production of electric power. Calculations showed that a d.c. transmission offers advantages above a gas pipeline.

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The economy of a d.c. transmission increases with the distance covered as compared to that of alternating current transmission. When the costs of d.c. transmissions with good prospects are to be calculated it is not advisable to proceed from the data provided by the Stalin-grad Power Station - Donbass project. There is no reason to doubt the possibility of building d.c. transmission lines with interspaced substations. Tests carried out on the line Kashira-Moscow with d.c. contactors (developed in the LPI, the Plant "Electric Apparatus and the NIPT) substantiate the possibility of switching off d.c. power in high tension-lines. In d.c. transmission the system for the control of the unified power systems can be considerably simplified and the individual systems require no synchronizing. There are 2 tables and 3 references, 3 of which are Soviet.

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Prospects in the Application of Direct-Current  
Transmission in the USSR

SOV/105-58-9-17/34

ASSOCIATION: 1) Institut elektrotekhniki Akademii nauk USSR (Institute of Electrical Engineering, AS UkrSSR) 2) Pervichnaya organizatsiya NTOEP Nauchno-issledovatel'skogo instituta postoyannogo toka (Subsection of the NTOEP at the Scientific Research Institute of Direct Current) 3) Nauchno-issledovatel'skiy institut postoyannogo toka (Scientific Research Institute of Direct Current)

Card 5/5

8(0)

AUTHOR:

Tsukernik, L. V., Candidate of  
Technical Sciences

SOV/105-59-1-4/29

TITLE:

General Theory of Stability by Lyapunov and Problems  
of Power System Stability (Obshchaya teoriya ustoychivosti  
Lyapunova i voprosy ustoychivosti energeticheskikh sistem)

PERIODICAL:

Elektrichestvo, 1959, Nr 1, pp 13-17 (USSR)

ABSTRACT:

Aleksandr Mikhaylovich Lyapunov (1857-1918) formulated the terms of "stability" and "lability" and created a theory of stability that is quite accurate in a mathematical respect. He established scientifically the "theory of small oscillations" used to examine the stability, and clarified the admissible limits for using the same. Lyapunov's idea was further developed by a number of Soviet scientists: Andronov, Bulgakov, Bogolyubov, Bautin, Duboshin, Yerugin, Letov, Lur'ye, Malkin, Moiseyev, Neymark, Tsypkin, Chetayev, and others. - The definitions introduced by Lyapunov are presented here in short. The further development of Lyapunov's theory of stability by Yerugin, Malkin and Duboshin, as well as by Chetayev, Malkin, and Duboshin in three different directions had a great importance,

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particularly in connection with the working out of the theory of "technical" stability (Ref 3). The latter is based on the assumption of finite deviation values and a finite time interval in the stability examination, and considers also the presence of external exciting forces. The problem of stability of alternating-current power systems consists in the following:

1) Guarantee of a synchronous rotation of rotors of main synchronous machines, and guarantee of the stability of the electromagnetic conversion process and energy transmission in a not excited operation method of the system; 2) guarantee of a transition to a new stabilizing operation method with arbitrary normal and given disturbing (damage) excitations. - In its first part, the problem belongs to stability "on a small scale", and in its second part to stability "on a large scale", and corresponds to the general problem of stability of motion as it was solved by Lyapunov. The closer study of the problem, and the great importance of automatic control of the excitation of synchronous machines to increase the stability of power systems, which was established by a series of examinations and tests in operation, led to a necessity of

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further developing the theory of electromagnetic transition processes in synchronous machines and the dynamics of their parallel work. In the USSR alone, about 300 investigations were dedicated to this problem. V. A. Venikov (Ref 6) gave a general survey of them. - The paper by Gorev (Ref 5) is pointed out, and the paper by Kron (Ref 11) is criticized. The latter does not correspond to usual ideas of exact argumentations and calculating methods. - In connection with applying the method of first approximation by Lyapunov to analyze the stability of complicated power systems, the question of admissibility of substitution of an ideally symmetrical group of synchronous machines by an equivalent one arose. In examining the stability of machine motion under consideration of the symmetry in each group, the coordinates marking the following two kinds of motion must be chosen as independent variables: 1) Motion of any machine of a group with respect to the independent axis (including the motion with respect to any machine of another group); 2) Motion of any machine of each group with respect to any machine of the same group. It is shown that in case 1) the stability can be analyzed for a

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substitution scheme in which all groups are represented by equivalent machines and the equations corresponding to them, whereas in case 2) the stability is to be analyzed for a complete electric substitution scheme of the system and for the corresponding equation of the relative motion of two machines of a symmetrical group. - Reference is made to the detailed analytic examination of the problem of stability of synchronous machines, published in 1932, by N. M. Krylov and N. N. Bogolyubov (Ref 4), and the necessary and sufficient conditions obtained there for Lyapunov stability.

The paper by Yanko-Trinitskiy (Ref 9) reports on the possibility of applying the direct method by Lyapunov. Experience shows that the calculating technique offers extensive and not much used possibilities for the solution of examples which formerly seemed impossible, on the basis of general theory and methods by Lyapunov. There are 11 references, 10 of which are Soviet.

SUBMITTED: July 5, 1958  
Card 4/4

AUTHOR: Tsukernik, L.V. (Kiyev)

SOV/24-59-4-4/33

TITLE: Stability of a Coupled Automatic-control System With  
Symmetry Within Groups of Units <sup>9</sup>

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh  
nauk, Energetika i avtomatika, 1959, Nr 4, pp 23-32 (USSR)

ABSTRACT: The system envisaged is a power grid, in which the various  
generating stations are coupled via the grid and each  
station has only one type of generator. The controls may  
be of several types, e.g. speed controls on the primary  
sources, excitation control on the generators, self-  
regulating synchronous compensators, etc. The equations  
of the perturbed motion are Eq (1); the matrix structures  
of the coefficients in Eqs (1) are given by Eqs (2). Table 1  
explains the symbols; the lines in the table read, in  
order: Matrix columns for the coordinates; Operator  
matrices for groups of identical objects; Elements of  
operator matrices; Subscripts indicating the objects within  
a group; Parameters controlled within the group;  
Subscripts to parameters belonging to the objects  
separately; Subscripts to parameters common to a group;

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Stability of a Coupled Automatic-control System With Symmetry Within Groups of Units <sup>SOV/24-59-4-4/33</sup>

Transfer functions of open-loop regulator circuits;  
Subscripts denoting the actions of the operator matrices  
on the various coordinates.  
The section down to Eqs (3) consists of some general  
remarks on the properties of matrices and of matrix  
representations. Eq (3) is a condition to be satisfied  
for the motion of a group; this condition, used with  
Eqs (1), gives Eqs (4) (in algebraic form). Eq (5) gives  
an example of the forms taken by the terms in Eqs (4).  
Eq (5') is an extra condition arising from the fact that  
all the units within a group are identical; Eq (6) gives  
a condition on the main determinant of Eqs (4). Eqs (7)  
relate to the relative motion of two units within a group;  
under these conditions the elements of matrix  $W$ , which  
relates to automatic controls on parameters common to the  
group, must all vanish, so we get Eqs (8) and (9). Eq (10)  
is a condition on the main determinant of Eqs (8); it is  
the condition for the relative motion to be stable.

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Then, Eqs (6) and (10) taken together give the conditions for stability in the coupled system as a whole. Eq (11) gives the structure of the determinant to Eqs (1). The order of Eqs (11) is given by Eq (11'); the properties of determinants are used to give Eqs (12).

The next section consists of a few general remarks about the elements appearing in Eqs (12); the result is that the characteristic equation can be put as Eqs (13). Eq (14) is a particular case in which all groups have the same number of objects and Eq (15) is further restricted to the case in which the relations between identical groups are the same.

Finally, two examples are considered. In the first (Figure 1), the speed and excitation are controlled in one group, while the speed and frequency are controlled in another; the resulting equations are (16) and (17) (before and after transformation). In the second (Figure 2), there is no automatic excitation control and electromagnetic transients in the machines are neglected.

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Groups of Units SOV/24-59-44/33

Here, the equations are (18) and (19), respectively.  
There are 2 figures and 5 Soviet references.

SUBMITTED: December 18, 1958

Card 4/4

TSUKERNIK, L.V.

Matrix algorithms of the characteristic equations for the  
limited analysis of stability in a complex power system. Nauch.  
dokl.vys.shkoly; energ. no.1:17-28 '59. (MIRA 12:5)

1. Rekomendovana Institutom elektrotehniki AN USSR.  
(Electric network analyzers)

TSUKERNIK, L.V., kand.tekhn.nauk

Liapunov's general theory of stability and stability problems  
of power systems. Elektrichestvo no.1:13-17 Ja '58.

(MIRA 12:5)

(Stability)

NESTERENKO, A.D., otv.red.; LEBEDEV, S.A., akademik, red.; TETEL'BAUM,  
S.I., red.[deceased]; TSUKERNIK, L.V., kand.tekhn.nauk, red.;  
MILYAKH, A.N., kand.tekhn.nauk, red.; KHRUSHCHOVA, Ye.V., kand.  
tekhn.nauk, red.; KISINA, I., red.izd-va; YEFIMOVA, M.I., tekhn.red.

[Problems in magnetic measurements] Voprosy magnitnykh izme-  
renii. Kiev, 1959. 117 p. (MIRA 12:8)

1. Akademiya nauk USSR, Kiyev, Institut elektrotekhniki.
2. Chlen-korrespondent AN USSR (for Nesterenko, Tetel'baum).  
(Magnetic measurements)



.TSUKERNIK, L.V.  
8(6); 28(1)

PHASE I BOOK EXPLOITATION

SOV/2497

.Akademiya nauk Ukrainskoy SSR. Institut elektrotekhniki.

Voprosy ustoychivosti i avtomatiki energeticheskikh sistem (Problems in Stability and Automation of Power Systems) Kiyev, Izd-vo AN UkrSSR, 1959. 186 p. (Series: Its: Sbornik trudov, vyp. 16) Errata slip inserted. 4,000 copies printed.

Ed. of Publishing House: T. K. Remennik; Tech. Ed.: N. P. Rakhlina;  
Editorial Board: A. D. Nesterenko, Corresponding Member, Ukrainian SSR Academy of Sciences (Resp. ed.), S. A. Lebedev, Academician, S. I. Tetel'baum, Corresponding Member, Ukrainian SSR Academy of Sciences, A. N. Milyakh, Doctor of Technical Sciences, Ye. V. Khrushcheva, Candidate of Technical Sciences, and L. V. Tsukernik.

PURPOSE: This collection of articles was published in line with a directive of the scientific council of the Electrical Engineering Institute, Academy of Sciences, UkrSSR. It is intended for scientific engineering and technical personnel concerned with problems of stability and automatic control of power systems.

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Problems in Stability and Automation (Cont.)

SOV/2497

COVERAGE: The authors analyze static stability of a complex power system, taking into account automatic control and load characteristics. They discuss transients in a compensated network during short-circuiting to ground and describe methods of calculating transients in current transformers. They also consider basic features of calculating current transformers with magnetizing and discuss linear theory of magnetic amplifiers as well as new types of frequency relays and frequency measuring devices. No personalities are mentioned. References appear at the end of each article.

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Tsukernik, L.V. Characteristics of Lyapunov's Theory of Stability and Problems of Stability of Power Systems	5
The author presents a brief review of studies on the theory of stability of power systems and shows the importance of Lyapunov's work on the general theory of stability. There are 35 references, all Soviet (including 2 translations).	
Tsukernik, L.V. Analysis of a Matrix of Equation Coefficients for a Disturbed Motion of a Complex Power System and Determination of the Order of a Characteristic Equation	21

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Problems in Stability and Automation (Cont.)

SOV/2497

The author obtains equations of disturbed motion of a complex power system, taking into account complex-load characteristics. He analyzes the matrix of equation coefficients and obtains operational expressions showing the effect of all branches of a power system on each individual branch. He also derives a formula for determining the order of a characteristic equation of a system. There are 4 references, all Soviet.

Sirata, I.M. Transients in a Compensated Network During Short-circuiting to Ground.

55

The author analyzes equivalent circuits of a complex compensated network and shows that transients during short-circuiting to ground may be calculated with the aid of an approximate simple equivalent circuit containing  $L$ ,  $c$  and  $R$ . He also discusses the effect of transient currents on the behavior of various types of relays and protection systems against short-circuiting to ground. He shows that the use of a polarized or permanent-magnet moving-coil relays operating on capacitance-current surges is possible only when relay speed is increased. There are 8 references: 7 Soviet and 1 English.

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Problems in Stability and Automation (Cont.)

SOV/2497

Kachanova, N.A., and V.N. Shestopalov. Short-time Unloading of a Receiving Power System as a Means of Increasing Stability 77

The authors discuss short-time unloading of a receiving power system with automatic reclosing for increasing system stability. They briefly describe the construction and results of testing of a combined frequency relay which may serve as a starting mechanism for short-time unloading. There are 3 references: 2 Soviet and 1 English.

Sirota, I.M. Methods of Calculating Transients in Current Transformers 87

The author presents a general analysis of a transient process and discusses a new and sufficiently accurate method of calculating transients. The method takes into account nonlinearity of magnetic characteristics of current-transformer core and inductance of a secondary-circuit load for any initial conditions. The author uses a method of so-called specific quantities as an auxiliary method of procedure and calculates transients with the aid of magnetization curves for iron for successive intervals of 0.25-0.50 periods. There are 13 references: 9 Soviet, 3 English and 1 German

Kubyshin, B.Ye. Problems of a Linear Theory of Magnetic Amplifiers 113

The author shows that a magnetic amplifier should be considered as a current or voltage generator controlled with d-c, a-c or pulse currents or voltages with a frequency lower than that of the magnetizing current.

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Problems in Stability and Automation (Cont.)

SOV/2497

He discusses equivalent circuits of magnetic amplifiers and derives expressions for amplifier parameters. There are 7 references, all Soviet (including 1 translation).

Kostyuk, O.M. Current transformers with D-C Magnetization and Basic Aspects of Calculating Transformers Used in Circuits for Automatic Field Regulation of Synchronous Generators

135

The author discusses a graphic-analytical d-c magnetization used in circuits for automatic field regulation of synchronous machines. There are 8 references: 6 Soviet, 1 English and 1 German.

CIRCUITS, DEVICES AND EXAMPLES OF CALCULATIONS

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Kachanova, N.A. and L.V., Tsukernik. Analysis of Static Stability of a Long-distance Transmission Line, Taking Into Account Complex Load Characteristics

153

The authors study the effect of voltage and frequency static characteristics of a complex load as well as the effect of dynamic characteristics of an equivalent induction motor on the stability of a long-distance power transmission line. They conclude that the dependence of load

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Problems in Stability and Automation (Cont,)

SOV/2497

conductance on voltage is the major factor affecting stability. There are 6 references, all Soviet.

Shestopalov, V.N. Device for Measuring Frequency

164

The author discusses an electronic device for frequency measurement by measuring the duration of a certain number of periods. The number of periods is counted by means of a trigger circuit similar to that used in computers. The duration is determined with the aid of a vacuum-tube generator stabilized by means of a tuning-fork electromechanical frequency transducer. Measurements obtained with the aid of the device are sufficiently accurate in the wide range of radio frequencies. There is 1 Soviet reference.

Kubyshin, B.Ye. Method of Calculating Magnetic Amplifiers on the Linear Theory.

174

The author considers methods of selecting operating conditions for amplifiers and determining coefficients required in calculations. He presents a numerical example of calculating a magnetic amplifier for contactless power commutation. There is 1 Soviet reference.

AVAILABLE: Library of Congress

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JP/gmp  
11-23-59

TSUKERNIK, L.

8(6); 28(1)

PLAS 1 BOOK REVOLUTION

1957/28/7

Abadmya nauk Ukrainy SSR. Institut elektrotekhniki.  
Voprosy ustoychivosti i avtomaticheskogo upravleniya sistem (Problems in  
Stability and Automatic Control of Power Systems) Kiev, Izd-vo AN Ukrainy, 1959.  
186 p. (Series: 18).  
4,000 copies printed.

Ed. of Publishing House: Z. K. Kuzmuk; Tech. Ed.: E. P. Babitskiy;  
Editorial Board: A. D. Isotrenko, Corresponding Member, Ukrainian SSR  
Academy of Sciences (Resp. ed.), S. A. Lebedev, Academician, S. I.  
Tsel'nom, Corresponding Member, Ukrainian SSR Academy of Sciences, A. B.  
Milyutin, Doctor of Technical Sciences, Ye. V. Zhuravlev, Candidate of  
Technical Sciences, and L. V. Tsukernik.

REMARKS: This collection of articles was published in line with a directive of the  
scientific council of the Ukrainian SSR Academy of Sciences, Academy of Sciences,  
Ukraine. It is intended for scientific, engineering and technical personnel con-  
cerned with problems of stability and automatic control of power systems.

CONTENTS: The authors analyze static stability of a complex power system,  
taking into account automatic control of the system. They discuss  
transients in a compensated system during short-circuiting to ground and de-  
scribe methods of calculating transients in current transformers. They also  
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135  
Tsukernik, L. Problems of a Linear Theory of Magnetic Amplifiers  
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135  
Kotelnik, O.M. Current Transformers with D-C Magnetization and Basic Aspects  
of Calculating Transients Used in Circuits for Automatic Field Regulation  
of Synchronous Generators  
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circuits for automatic field regulation of synchronous machines. There  
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CIRCUITS, DEVICES AND EXAMPLES OF CALCULATIONS

135  
Kuznetsov, N.A. and Ye. V. Tsukernik. Analysis of Static Stability of a  
Compensated Transmission Line, Taking Into Account Complex Load  
Characteristics

135  
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power transmission line. They conclude that the dependence of load  
conductance on voltage is the major factor affecting stability. There are  
6 references, all Soviet.

139  
Dzhalalov, V.J. Device for Measuring Frequency  
The author discusses an electronic device for frequency measurement by  
measuring the duration of a certain number of periods. The number of  
periods is counted by means of a trigger circuit similar to that used  
in computers. The duration is determined with the aid of a vacuum-  
tube generator stabilized by means of a tuning-fork electrochemical  
frequency transducer. Measurements obtained with the aid of the device  
are sufficiently accurate in the wide range of radio frequencies. There  
is 1 Soviet reference.

174  
Ruhvalda, B.Ze. Method of Calculating Magnetic Amplifiers on the Linear  
Theory  
The author considers methods of selecting operating conditions for  
amplifiers and determining coefficients required in calculations. He  
presents a numerical example of calculating a magnetic amplifier for  
contactless power commutation. There is 1 Soviet reference.

AVAILABLE: Library of Congress

5

KACHANOVA, N.A.; TSUKERNIK, I.V.

Analyzing the static stability of long-distance power transmission  
with consideration of complex load characteristics. Sbor. trud. Inst.  
elektrotekh. AN URSR no.16:153-163 '59. (MIRA 12:9)  
(Electric network analyzers)



TSUKERNIK, L.V., kand. tekhn. nauk

Analyzing the matrix coefficients of disturbed-motion equations of a complex power system and determining the order of the characteristic equation. Sbor. trud. Inst. elektrotekh. AN URSR no.16:21-54 '59.

(MIRA 12:9)

(Electric networks) (Electric machinery, Synchronous)

TSUKERNIK, L.V., kand. tekhn. nauk

Short analysis of Liapunov's stability theory and stability problems  
in power systems. Sbor. trud. Inst. elektrotekh. AN USSR no.16:5-20  
'59. (MIRA 12:9)

(Electric networks) (Stability)

TSUKERNIK, L.V. (Kiyev)

Stability of a linked automatic control system with intragroup  
symmetry. Izv. AN SSSR. Otd.tekh.nauk. Energ. i avtom. no.4:  
23-32 J1-Ag '59. (MIRA 12:11)  
(Automatic control) (Electronic engineering)

TSUKERNIK, N.V.

Conference on the use of computer technology in operating and  
designing electric power systems. Avtomatyka no. 5:70-71 '60.

(MIRA 14:4)

(Electronic calculating machines) (Electric power distribution)

MARKOVICH, I.M., doktor tekhn.nauk; TAFT, V.A., doktor tekhn.nauk;  
SOVALOV, S.A., kand.tekhn.nauk; VENIKOV, V.A., doktor tekhn.nauk;  
TSUKERNIK, L.V., kand.tekhn.nauk

Problems on the use of computers in designing and operating  
electric power systems. Elektrichestvo no. 12:9-15 D '60.  
(MIRA 14:1)

1. Energeticheskiy institut AN SSSR (for Sovalov). 2. Moskovskiy  
energeticheskiy institut (for Venikov). 3. Institut elektrotekh-  
niki AN USSR (for TSukernik).

(Electronic claculating machines)

(Electric power plants)

TSUKERNIK, L.V., kand.tekhn.nauk

Use of new computer technology in the design and operation of  
electric power systems. Elektrichestvo no.10:85-87 0 '60.

(Electric power plants)

. (Electric calculating machines)

TSUKERNIK, L.V., kand.tekhn.nauk

Conference on the use of computer technology in designing  
and operating electric power systems. Elek. sta. 31 no.9:  
90-91 S '60. (MIRA 14:10)  
(Electronic calculating machines)  
(Electric power plants)

VENIKOV, V.A., prof., doktor tekhn.nauk, laureat Leninskoy premii, red.;  
ASTAKHOV, Yu.N., red.; TSUKERNIK, L.V., red.; LARIONOV, G.Ye.,  
tekhn.red.

[Use of computers in electric power systems; collection of  
translated articles] Primenenie schetno-reshaiushchikh ustroystv  
v elektricheskikh sistemakh; sbornik perevodnykh statei pod red.  
V.A.Venikova. Moskva, Gos.energ.izd-vo, 1960. 215 p.

(MIRA 14:1)

(United States--Electronic computers)  
(United States--Electric power distribution)



MARKOVICH, I.M., doktor tekhn.nauk; TAFT, V.A., doktor tekhn.nauk;  
SOVALOV, S.A., kand.tekhn.nauk; VENIKOV, V.A., doktor tekhn.  
nauk; TSUKERNIK, L.V., kand.tekhn.nauk

Present-day use of computers in designing and operating electric  
power systems. Elektrichestvo no. 11:1-8 N '60. (MIRA 13:12)

1. Energeticheskiy institut AN SSSR (for Markovich, Taft & Sovalov).
2. Moskovskiy energeticheskiy institut (for Venikov). 3. Institut  
elektrotekhniki AN USSR (for TSukernik).  
(Electronic calculating machines)  
(Electric power)

TSUKERNIK, L.V.

Scientific and technical conference on the use of computer  
techniques in designing and operating electric power systems.  
Izv. vys. ucheb. zav.; elektromekh. 3 no.6:144-145 '60. (MIRA 15:5)  
(Electronic calculating machines)  
(Power engineering)

SINOTA, Igor' Moyseyevich; TSUKERNIK, L.V., kand. tekhn. nauk, otv.  
red.; LABINOVA, N.M., red. izd-va; LISOVETS, A.M., tekhn.  
red.

[Transient operating conditions in electric current  
transformers] Perekhodnye rezhimy raboty transformatorov toka.  
Kiev, Izd-vo Akad. nauk USSR, 1961. 191 p. (MIRA 15:3)  
(Electric transformers)

TSUKERNIK, L.V.

Use of a "balancing node" method for calculating the operation of  
and electric power system. Trudy Inst. elektrotekh. AN URSR  
no.19:89-100 '62. (MIRA 16:5)

(Electric power distribution)  
(Electric networks)

TSUKERNIK, L.V.

Normalization of the equations of perturbed motion of complex power system in calculations of stability and electromechanical transient processes. Trudy Inst. elektrotekh. AN USRS no.19: 101-109 '62. (MIRA 16:5)

(Electric power distribution)

YENIKOV, V. A.; TSUKERNIK, L. V.

" The Development of Methods of Cybernetic Control  
for Integrated Electrical Power Systems. "

Paper to be presented at the IFAC Congress to be  
held in Basel, Switzerland, 27 Aug to 4 Sep 63

GLEBOV, I.A.; KASHTEL'YAN, V.Ye.; NOVITSKIY, V.G.; SIDEL'NIKOV, V.V.;  
SIROTKO, V.K.; MEL'NIKOV, N.A.; LUGINSKIY, Ya.N.; STERNINSON,  
L.D.; YUREVICH, Ye.I.; TSUKERNIK, L.V.

Scientific problems in the field of automatic control and regu-  
lation of large electric power systems and their elements.  
Sbor. rab. po vop. elektromekh. no.10:23-40 '63.

(MIRA 17:8)

TSUKERNIK, L.V.

Automatic control of large converter systems for increasing the  
stability of electric power systems. Trudy Inst. elektrotekh.  
(MIRA 17:11)  
AN URSR 20:117-122 '63.



VENIKOV, V.A.; KAMYNIN, S.M.; LITKENS, I.V.; TSUKERNIK, L.V.

Automatic excitation controller with strong action for power  
plants operating in complex electrical systems. Trudy MEI  
no.54:53-82 '64. (MIRA 17:12)

KHOLMSKIY, V.G., doktor tekhn. nauk; TSUKERNIK, L.V., doktor tekhn. nauk; SHCHERBA  
BINA, Yu.V., kand. tekhn. nauk

Some results and objectives of research in the application of digital  
computers in the field of electric power engineering. Energ. i elek-  
trotekh. prom. no.2:6-8 Ap-Je '64. (MIRA 17:10)

VENIKOV, V.A., doktor tekhn. nauk, prof., Laureat Leninskoy premii;  
GORSKIY, Yu.M., kand. tekhn. nauk, nauchnyy sotrudnik;  
SOLDATKINA, L.A., kand. tekhn. nauk, dotsent; MARKOVICH, I.M.,  
doktor tekhn. nauk; KHOLMSKIY, V.G., prof., doktor tekhn. nauk;  
TSUKERNIK, L.V., doktor tekhn. nauk;

On N.A. Kartvelishvili's comments: "Errors in the determination  
of the probability of stability disturbance for some dynamic  
systems." Izv. AN SSSR. Mekh. i mashinostr. no.4:195-200  
Jl-Ag '64

1. Zaveduyushchiy kafedroy "Elektricheskiye sistemy" Moskov-  
skogo energeticheskogo instituta (for Venikov).

none  
L. G. (Kiev); Korobchuk, K. V. (Kiev); Tsukornik, L. V. (Kiev)  
SOURCE CODE: UR/0281/66/000/001/0106/01  
TITLE: Uniqueness of the results and the convergence of the iteration calculation of the stationary electrical operating conditions within a power system  
SOURCE: AN SSSR. Izvestiya. Energetika i transport, no. 4, 1966, 106-110  
TOPIC TAGS: iteration, algorithm, digital computer  
ABSTRACT: Some authors mention briefly (see, e.g., L.V. Tsukornik, Tr. Instituta elektrotekhniki AN USSR, "Voprosy primeneniya vychislitel'noy tekhniki v energeticheskikh sistemakh" (Reports of the Institute of Electric Engineering of the SSSR, "Problems of Application of Computer of Technology in Power Systems"), 1962, No 19) that because of the nonlinearity of the equations of nodal voltages in electrical networks, calculations on digital computers may lead to unique solutions. The authors thus investigated trial calculations carried at the Institute of Electrodynamics of the AS Ukr SSR aiming at the calculation of the peculiarities of algorithms and programs for the calculation on digital computers of stationary operating conditions of complex power systems. Results of the calculations in which participated also V.N. Avramenko

I 09205-67  
ACC NR: AP7002774

are presented in tabular form. 1) the nonlinearity of the equations of the power system; 2) the condition of the power system as initial information, the accuracy of the calculation; 3) the possible number of iterations; 4) the number of calculations. Orig. art. has: 12, 09 / SUBM DATE: 1965

UDC: 621.311.1.001.24

"APPROVED FOR RELEASE: 04/03/2001

CIA-RDP86-00513R001757210006-2"

SUB CODE: 12, 09 /

SUBM DATE: 1965

TSUKERNIK, L.V., doktor tekhn. nauk; KACHANOVA, N.A., kand. tekhn. nauk;  
UMED'YAN, V.V., inzh.; AVRAMENKO, V.N., inzh.

Program for the analysis of the dynamic stability of complex  
electric power systems using electronic digital computers.  
Energ. i elektrotekh. prom. no.4:3-4 O-D '65. (MIRA 19:1)

TSUKERNIK, L.Ya.; TOMKEVICH, I.O.; TEPYAKOV, G.V.

Fortieth anniversary of the Great October. Izobr.v SSSR 2 no.7:21  
Jl '57. (MLRA 10:7)

(Socialist competition)

TSUKERNIK, M.

BARATS, I.; TSUKERNIK, M.

Sources of the formation of working capital in industrial enterprises. Fin.SSSR 18 no.1:27-30 Ja '57. (MLRA 10:2)

(Russia--Industries) (Finance)

TSUKERNIK, M.S., kand.tekhn.nauk, dotsent

Improving economic work so as to shorten building time. Trudy  
MIEI no.15:400-403 '61. (MIRA 14:12)

1. Khar'kovskiy institut inzhenerov kommunal'nogo stroitel's'tva.  
(Construction industry)



TSUKERNIK, M.S., dotsent, kand.tekhn.nauk

Improving economic accountability in the construction industry.  
Trudy MIEI no.14:610-613 '59. (MIRA 13:1)

1. Khar'kovskiy institut inzhenerov kommunal'nogo stroitel'stva.  
(Construction industry--Accounting)



TSUKERNIK, M.V.

Effect of hibernation on the glycogen, lactic acid and ketone-body contents of the organism. M.V. Tsukernik. *Biochem. J.* (Ukraine) 12, 539-40 (in Russian, 501-1; in English, 512) (1938). -The glycogen and lactic acid contents of the liver, muscles and blood of hibernating marmots is lower than in the waking state. The ketone bodies of the muscles and liver vary within normal limits, while the blood ketones are lowered. The low R. Q. observed during hibernation cannot therefore depend upon the accumulation of insufficiently oxidized products of fat metabolism.

ASB-514 METALLURGICAL LITERATURE CLASSIFICATION

TSUKERNIK, S.S.

Clamp for rim saws during grinding. Stan.i instr. 34 no.3:43 Mr '63.  
(Grinding machines) (MIRA 16:5)

KHOLOPOVA, Z.I., inzh.; TSUKERNIK, S.V., inzh.

Selection of the class of heat resistance of the insulation  
of low-voltage electrical machines. Elektrotehnika 35 no.11:  
23-27 N '64. (MIRA 18:6)

SOV/110-58-7-2/21

AUTHOR: Skorik, N.S., Engineer, Kholopova, Z.I., Engineer,  
and Tsukernik, S.V., Engineer.

TITLE: On the nature of moisture absorption by continuous  
mica foil insulation of high-voltage machines  
(O kharaktere uvlazhneniya nepreryvnoy nikalentoynoy  
izolyatsii vysokovol'tnykh mashin)

PERIODICAL: Vestnik Elektromyshlennosti, 1958, Nr 7 pp 6-12 (USSR)

ABSTRACT: It is important to know whether high-voltage elec-  
trical machines may be connected up without first  
drying-out. The answer to this question depends  
on the design of the windings, their insulation and  
degree of dampness. The following factors should  
be taken into account: the condition of the slot  
insulation and the end-windings; the possibility  
of break-down of insulation at joints and winding  
clamps with flash-over to the frame; the possibi-  
lity that intensive drying may damage the insulation.

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On the nature of moisture absorption by continuous  
mica foil insulation of high-voltage machines

This article is concerned only with high-voltage machines with coil-type windings having continuous mica foil compound-impregnated insulation for voltages up to 6.6 kV. Tests made at the Kharkov Electro-mechanical works show that the electrical properties of this kind of insulation remain good even after prolonged exposure to moisture. Break-down voltage data for damp and dry 6-kV insulation of this type is given in Table 1, which shows that exposure for 20 days to a relative humidity of 95 - 98% at 20°C reduces the break-down voltage by only 3.4% and 40 days exposure reduces it by 3.7%. Immersion in water for 20<sup>4</sup> days reduced the break-down voltage by 43% but the insulation was still

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SOV/110-58-7-2/21

On the nature of moisture absorption by continuous mica foil insulation of high-voltage machines

suitable for operation. Models were made up to determine the depth of water-penetration into mica-foil compound impregnated insulation. The amount of water absorbed on exposure was determined and the results are given in Fig. 2. It will be seen that the moisture absorption was much greater when the insulation was finished with an external covering of cotton tape, which, indeed, absorbed most of the moisture. The total quantity of moisture absorbed, the amount absorbed by the surface tape and the amount absorbed by the mica insulation are shown in Fig. 3. It will be seen that what little moisture is absorbed by the micafoil is mostly held in the outside layers. There is at present no satisfactory method of assessing the dampness of the insulation of electrical machines. Insulation-resistance measurements are commonly used for this purpose, but they cannot distinguish between surface- and volume-resistance and, therefore, cannot reveal whether moisture has penetrated deeply into the insulation. Data about changes in these two

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On the nature of moisture absorption by continuous mica foil insulation of high-voltage machines

resistances and in the total insulation resistance of 6-kV windings after exposure in a humidity chamber are given in Fig. 5. It will be seen that the surface resistance falls much more than the volume resistance and determines the insulation resistance figures for the machine. The main electrical characteristics of the insulation of the joints and winding clamps in the dry and the damp condition are given in Table 2. Specific values of surface- and volume-resistivity for damp high-voltage micafoil compound-impregnated insulation are given in Fig. 6, which also includes for comparison corresponding data for varnished cloth insulation. It is shown how reliance on insulation resistance measurements may lead to false conclusions about the degree of dampness of insulation. It is sometimes recommended to base assessments on the ratio

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On the nature of moisture absorption by continuous  
mica foil insulation of high-voltage machines

SOV/110/58-7-2/21

of the insulation resistance 60 secs after the application of voltage to that after 15 secs. This method is also unsatisfactory. In deciding whether a machine can be connected-up without drying, the important factor is the characteristics of the insulation of joints and winding clamps, including the possibility of surface flashover of this insulation. This question was studied by making surface-resistance and flashover tests on wet micafoil compounded 6-kV insulation treated with grey enamel. The tests were made on sections that had been in water for 2 and 25 days. The results are given in Table 3 and the results are discussed. It is concluded that there is no risk of surface flashover of insulation that has been immersed in water when double the working voltage (about 8 kV) is applied provided that the distance between the electrodes is greater than 50 mmms, which it usually is in practice. On the basis of the work described, it is

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On the nature of moisture absorption by continuous mica foil insulation of high-voltage machines SOV/110/59-7-2/21

considered that to connect-up without preliminary drying-out is permissible in electrical machines of rated voltage up to 6.6 kV having stator coil windings insulated with compound-impregnated continuous micafoil insulation. This applies to machines which have been in a works or in stores or under normal transport conditions, and supposes that the machines have not been left unpacked out of doors for a long time and have not been in water. Before applying voltage the total insulation resistance of the cold stator winding should be checked and should not be less than 50 megohms. Load should be applied gradually at first. There are 3 tables and 6 figures.

Card 6/6

1. Insulation (Electric)--Absorptive properties
2. Electric machinery--Insulation

TSUKERNIK, S. V.

"The Insulation of Low-voltage Class F Machines,"

(KHEMZ)

Report presented at a Conference on New Materials, Insulating Materials and  
Manufacturing Processes, Leningrad, Nov 1984

TSUKERNIK, S.V.

SKORIK, N.S., inzh.; KHOLOPOVA, Z.I., inzh.; TSUKERNIK, S.V., inzh.

Electric strength of insulation of stator windings in high-voltage electric machines. Vest. elektrom. 29 no. 7-12 P '58. (MIRA 11:3)

1. Khar'kovskiy elektromekhanicheskii zavod.  
(Electric insulators and insulation)

*Tsukernik, S.V.*

110-2-2/22

**AUTHORS:**

Skorik, N.S. (Engineer), Kholopova, Z.I. (Engineer) & Tsukernik, S.V.  
(Engineer).

**TITLE:**

On the electric strength of stator winding  
insulation on high voltage electrical machines. (K voprosu  
elektricheskoy prochnosti izolyatsii obmotok statora vysokovol  
nykh elektricheskikh mashin).

**PERIODICAL:**

Vestnik Promyshlennosti, 1958,

No.2, pp.7-12. (USSR)

**ABSTRACT:**

The electric strength of machine insulation is defined as the r.m.s. sinusoidal voltage which causes breakdown when applied for one minute. The present article refers only to 6 and 6.6 kV machines with continuous mica-tape compound-impregnated insulation. The mean breakdown voltage of coils has been given as 30 - 42 kV (the lower value relating to insulation of reduced thickness) and the minimum voltage to 22 - 23 kV. The great difference between the maximum and minimum values should be noted. Curves of the distribution of breakdown voltages of coil insulation are given in Fig.1. The scatter of results, though wide, is normally distributed and depends on the non-uniformity of the insulating material and its method of application. As usual in cases of this kind, the breakdown voltage depends on the size of the electrodes. Curves of the probability of breakdown of compound-impregnated mica-tape insulation of 6 - 6.6 kV stator windings are given in Fig.2. The dotted curves relate to values re-calculated to a constant electrode area by a formula which

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On the electric strength of stator winding insulation on high voltage electrical machines.

is given. Because of the electrode area effect, the breakdown voltage for windings as a whole will be lower than that of individual coils; curves displaying this effect are given in Fig.3. The results confirm that the test voltages in the standard **FOCT-183-55** for the insulation of 6-8.6 kV are correctly chosen and correspond to the actual insulation level. The disadvantages of using higher test voltages during manufacture are explained: machines made to the present test voltage level have proved reliable. The use of voltage tests for maintenance purposes is then discussed at length. The level of test voltage that can be considered non-destructive to the insulation is considered. Data about the probability of breakdown of new mica-tape, compound-impregnated insulation which has not been subjected to preliminary high-voltage testing are given in Fig.4. These curves are derived from tests on 160 coils made with reduced insulation in order to get a reasonable number of breakdowns. The results show that when the breakdown voltage level is high, compared with the value of the frequently applied test voltage, the latter makes little difference to the probability of breakdown. However, when the test voltage is nearer to the breakdown voltage there is a considerable increase in frequency of breakdown. These results show that frequent application for one minute of voltages of 13.2 and 21 kV would cause deterioration in insulation having a breakdown voltage 1.7 - 1.8 times higher than

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On the electric strength of stator winding insulation on high voltage electrical machines.

the test voltage. In general, application of a voltage much over 1.5 times the rated voltage will cause damage. This argument is developed at length and it is claimed that still lower maintenance test voltages, not greater than 1.2 - 1.4 rated voltage, should be used if insulation has been in service for a long time or is in bad condition. There are 4 figures, 4 literature references (all Russian).

SUBMITTED: September, 27, 1957.

ASSOCIATION: Khar'kov Electro-Mechanical Works (Khar'kovskiy elektromekhanicheskiy zavod)

AVAILABLE: Library of Congress.

Card 3/3.



TSUKERNIK, S.V.

SKORIK, N.S., inzhener; TSUKERNIK, S.V., inzhener; LYSAKOVSKIY, G.I.,  
kandidat tekhnicheskikh nauk; ZVEZDKIN, V.N., inzhener; IZRAYELIT,  
G.R., inzhener; KOZYREV, N.A., kandidat tekhnicheskikh nauk;  
KULAKOVSKIY, V.B., kandidat tekhnicheskikh nauk; KARAMZIN, A.P.,  
inzhener; ALEKSEYEV, S.V., inzhener.

Electrical strength of stator winding insulation in 6-6. 6 kv  
electric machines. Elek.sta. 27 no.4:38-51 Ap '56. (MLRA 9:8)

1. Khar'kovskiy elektromekhanicheskiy zavod (for TSukernik);
  2. Donbassenergo (for Lysakovskiy); 3. Lenenergo (for Izrayelit);
  4. LPI (for Kozyrev); 5. TSentral'naya nauchno-issledovatel'skaya  
elektrotekhnicheskaya laboratoriya (for Kulakovskiy); 6. Sverdlov-  
energo (for Karamzin); 7. Mosenergo. (for Alekseyev).
- (Electric insulators and insulation--Testing)

KHOLOPOVA, Z.I., inzhener; TSUKERNIK, S.V., inzhener.

Protecting the insulation of electric machinery windings against  
mold fungi. Vest.elektroprom. 27 no.12:59-62 D '56. (MLRA 10:1)

1.Khar'kovskiy elektromekhanicheskiy zavod.  
(Electric insulators and insulation) (Molds (Botany))

TSUKERNIK, S.V.  
KHOLOPOVA, Z.I., inzhener; TSUKERNIK, S.V., inzhener.

Action of weld on electric apparatus with plastic parts. Vest. elektre-  
prom. 28 no.3:72-73 Mr '57. (MLRA 10:4)

1. Khar'kovskiy elektromekhanicheskiy zavod.  
(Electric apparatus and appliances) (Plastic materials)  
(Welds (Botany))

TSUKERNIK, S.V.,  
A. D. IMAS, Russ. 53,416, July 31, 1938.

KHOLOPOVA, Z.I., inzh.; TSUKERNIK, S.V., inzh.

Heat resistance of windings using aluminum and copper wires  
with enamel insulation based on polyamide resol and polyester  
laquers. Elektrotehnika 36 no.8:1-4 Ag '64.

(MIRA 17:9)

SOV/ 49-58-11-4/18

AUTHORS: Karus, Ye. V. and Tsukernik, V. B.

TITLE: Ultrasonic Apparatus for Determination of Physico-Mechanical Properties of Rocks Intersected by a Bore Hole  
(Ul'trazvukovaya ustanovka dlya izucheniya fiziko-mekhanicheskikh svoystv porod, peresekayemykh skvazhinoy)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, 1958, Nr 11, pp 1310-1322 (USSR)

ABSTRACT: A prototype of the apparatus for determination of the properties of rocks by means of sound waves was made in 1956 by the members of the Seismic Department of the Institute of Physics of the Earth, Ac.Sc., USSR. The general layout of the apparatus is shown in Fig.1. The electric impulse produced by the generator 1 goes by means of the collector 2 and the cable 3 into the receiver placed inside the sonde 4. The receiver (of piezo-segment type) transforms the electric impulses into mechanical vibrations which spread into the surrounding medium as elastic waves. The waves along the well are registered by means of two receivers which are placed also inside the sonde and isolated from each other. After being amplified in the amplifiers 5 and 6 they

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Ultrasonic Apparatus for Determination of Physico-Mechanical  
Properties of Rocks Intersected by a Bore Hole

are diverted into the seismoscope 7 where they can be observed on the screen or photographed by the camera 8. Figs. 2, 3 and 4 show the circuits of the impulse generator, amplifier and seismoscope respectively. Fig.5 gives the frequency of the apparatus in units of kh. The experimentations were carried out with the apparatus placed inside a well drilled through the layer of upper-jurassic growth of 700-1000 m deep. The temperature and the electric properties of the rocks were measured and found to be of uniform character. That part of the well which was clad with metal rings produced the PPP waves on the screen of the apparatus (Fig.6). Their velocity was  $V_p = 5350$  m/sec. The part with no cladding produced three types of waves PPP, PSP and the third, which had very intensive oscillations in the liquid contents of the lower part of the well (Fig.7). Another example of seismograms are shown for the waves PPP (Fig.8) and PSP (Fig.9). Three series of velocity measurements were carried out. The results are shown in Fig.10 (1-3) where the data of two receivers are also included. The table

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Properties of Rocks Intersected by a Bore Hole

shows the accuracy of the measurements as calculated from expressions (1) and (2). The character and frequency of the waves were analysed by means of the photo-electric spectro-analyser. The examples are shown in Fig.11 (PPP wave) and Fig.12 (PSP wave). It was found that the intensity of the PSP waves was always greater than that of the PPP waves. The main relation of the amplitude was 3.5. The absorption of the surrounding medium was calculated from the expression (3) where the results of two receivers are employed. It should be noted that the data obtained from the experimentations would be much more precise if the apparatus could be adapted for the multi-channel system of observations. Then, the hodographs and graphs of amplitudes could be produced.

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Ultrasonic Apparatus for Determination of Physico-Mechanical  
Properties of Rocks Intersected by a Bore Hole

There are 12 figures, 1 table and 20 references, 15 of  
which are Soviet, 4 English, 1 Polish.

ASSOCIATION: Akademiya nauk SSSR, Institut fiziki Zemli  
(Institute of Physics of the Earth, Ac.Sc. USSR)

SUBMITTED: November 21, 1957

Card 4/4

S/169/63/000/003/040/042  
D263/D307

AUTHOR: Tsukernik, V.B.

TITLE: New data on the sub-ice relief in the central sector of Eastern Antarctica from seismogravimetric data

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 3, 1963, 13, abstract 3D78 (Inform. byul. Sov. antarkt. ekspedit-sii, 1962, no. 32, 10-14)

TEXT: A brief description is given of the method of seismic and gravimetric studies during the sledge-tractor intracontinental traverse of the 5th Antarctic expedition (from Mirnyy to Vostok). A preliminary section is given of the ice cover along the route. Comparison of this section with profiles obtained by Soviet expeditions allowed the construction of a scheme characterizing the sub-ice relief of the central sector of Eastern Antarctica. Results of the work confirm the presence in E. Antarctica of a zone of sublatitudinal uplifts, a zone of sub-ice plains, and a zone of central mountain structures of sub-meridional strike and also the isostatic compensa-

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New data on the sub-ice ...

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D263/D307

tion of the load of the icecap by an overall sinking of the continent.

[Abstracter's note: Complete translation]

Card 2/2

TSUKERNIK, V.B., mladshiy nauchnyy sotrudnik; FBOLOV, A.I., kand.tekhn.nauk;  
STROYEV, P.A., starshiy inzhener

Structure of the Pobeda ice island based on geophysical data. Inform.  
biul. Sov. antark eksp. no.37:29-33 '62. (MIRA 16'4)

1. Institut fiziki Zemli AN SSSR i Gosudarstvennyy astronomicheskiy  
institut.

(Shackleton ice shelf region—Geophysics—Observations)

~~TSUKERNIK, V.B.~~; FROLOV, A.I.; STROYEV, P.A.

Seismic and grametric studies in the West Shelf Ice in Antarctica.  
Izv. AN SSSR. Ser. geofiz. no.6:907-921 Je '63. (MIRA 16:7)

1. Institut fiziki Zemli AN SSSR i Gosudarstvennyy astronomicheskiy  
institut imeni P.K.Shternberga.

(West shelf ice--Seismic prospecting)  
(West shelf ice--Gravity prospecting)

TSUKERNIK, V.B., mladshiy nauchnyy sotrudnik; FROLOV, A.I., kand. tekhn.  
nauk; STROYEV, P.A., starshiy inzh.

Using seismic and gravimetric methods to study the sub-ice relief  
of the West Shelf Ice. Inform. biul. Sov. antark. eksp. no.40:  
19-24 '63. (MIRA 16:7)

1. Institut fiziki Zemli AN SSSR i Gosudarstvennyy astronomi-  
cheskiy institut.

(West Shelf Ice--Land forms)  
(Prospecting--Geophysical methods)

TSUKERNIK, V.B., mladshiy nauchnyy sotrudnik

Magnetometric survey in the West Shelf Ice. Inform.bivl. Sov.antark.  
eksp no.43:45-47 '63. (MIRA 17:1)

1. Pyataya kontinental'naya ekspeditsiya.

L 26752-66 EWT(1)/EWA(h) GW

ACC NR: AP6009538

(A,N)

SOURCE CODE: UR/0413/66/000/005/0074/0074

AUTHORS: Sorokhtin, O. G.; Borkovskiy, G. M.; Tsukernik, V. B.; Neymark, G. S.;  
Dolinskiy, Yu. D.

27

B

ORG: none

TITLE: Multichannel seismic station with intermediate digital magnetic recording.  
Class 42, No. 179482 [announced by All-Union Scientific Research Institute of  
Geophysical Exploration Methods (Vsesoyuznyy nauchno-issledovatel'skiy institut  
geofizicheskikh metodov razvedki)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 5, 1966, 74

TOPIC TAGS: seismologic station, computer application

ABSTRACT: This Author Certificate presents a multichannel seismic station with intermediate digital magnetic recording. The station contains seismic detectors, amplifiers, channel commutators, level setting devices, an analog to digital code converter, and a magnetic recorder. To provide for possible processing of the information on digital and analog computers, a digital code to analog converter, a channel distributor, and a device for selection and recording of the analog information are connected in series to the output of the reproduction amplifier of the magnetic recorder (see Fig. 1). To broaden the dynamic range of the received

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UDC: 550.340.84

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L 26792-66

ACC NR: AP6009538

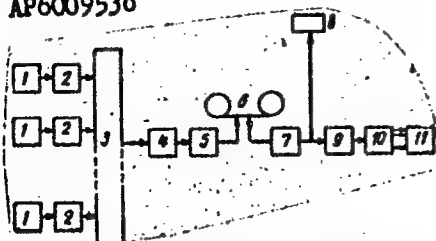


Fig. 1. 1 - seismic detectors; 2 - pre-amplifiers; 3 - channel commutator; 4 - basic amplifier; 5 - direct digital converter; 6 - magnetic recorder; 7 - reproduction amplifier; 8 - digital computer; 9 - digital to analog converter; 10 - channel distributor; 11 - recorder.

signals, a basic amplifier is connected between the channel commutator and the direct digital converter. Orig. art. has: 1 diagram.

SUB CODE: 08, 09/ SUPM DATE: 30Dec63

Card 2/2 dda

STROYEV, P.A., starshiy inzhener; FROLOV, A.I., kand. tekhn. nauk; TSUKERNIK, V.B.,  
mladshiy nauchnyy sotrudnik

Structure of the relief under the ice in the Mirnyy region. Inform.  
biul. Sov. antark. eksp. no. 49:24-28 '64.

(MIRA 18:5)

1. Gosudarstvennyy astronomicheskiy institut imeni Shternberga,  
Moskva.

STROYEV, P.A.; FROLOV, A.I.; TSUKERNIK, V.B.

Subglacial topographic structure of the region of the Antarctic  
station Mirny according to geophysical data. Izv. AN SSSR. Fiz.  
zem. no.1:121-126 '65. (MIRA 18:5)

1. Gosudarstvennyy astronomicheskiy institut imeni Shternberga.

N/5  
741.711  
.15

TSUKERNIK, V. L.

Kompaundirovaniye i elektromagnitnyy korrektor napryazheniya sinkhronnykh  
generatorov (Compounding and the electromagnetic pressure corrector in syn-  
chronous generators, by) V. L. Inosov i. L. V. Tsukernik. Moskva, Gosen-  
ergoizdat, 1954.

149 p. illus., diags., tables.

"Literatura": p. (151)

GENKIN, G.M.; GOLUBEVA, N.G.; TSUKERNIK, V.M.

Spin-phonon width of the antiferromagnetic resonance line. Fiz.  
tver. tela 6 no.3:818-826 Mr '64. (MIRA 17:4)

1. Radiofizicheskiy institut, Gor'kiy.

TSUKERNIK, V. M.

TSUKERNIK, V. M.: "On the theory of antiferromagnetism." Min Higher Education Ukrainain SSR. Khar'kov Order of Labor Red Banner State U imeni A. M. Gor'kiy. Khar'kov, 1956.  
(Dissertation for the Degree of Candidate in Physicomathematical Sciences.)

SO: Knizhnaya Letopis', No. 26, 1956

126-3-34/34

AUTHOR: Tsukernik, V.M.

TITLE: On the theory of antiferromagnetism. (K teorii anti-ferromagnetizma).

PERIODICAL: "Fizika Metallov i Metallovedeniye" (Physics of Metals and Metallurgy), 1957, Vol.4, No.3, pp. 566-567 (U.S.S.R.)

ABSTRACT: An accurate solution of the problem of the basic state of an antiferromagnetic was given by Bethe, N. (1) for a unidimensional antiferromagnetic lattice. For multi-dimensional lattices it is necessary to make additional assumptions on the spin structure of the antiferromagnetic in its basic state. The existing theory is based on the correct alternation of "right" and "left" spins in the basic state. This assumption does not contradict neutronographic results obtained on antiferromagnetics at low temperatures and gives a temperature dependence for the magnetic moment which is in satisfactory agreement with experimental data. By means of this model the author of this paper considered the kinetic processes in antiferromagnetics at low temperatures. For this purpose it is first necessary to know the energy spectrum and the spin wave functions of the system and this was established by means of the general method which was earlier used for investigating the thermal

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On the theory of antiferromagnetism. (Cont.) 126-3-34/34

oscillations in crystals, a method which was also used by S. V. Tyablikov (2). The author limited himself to exchange interactions and interactions with the external magnetic field, the Hamiltonian of which can be expressed by means of eq.(1), p.566. The probability of transitions for the respective interactions can be determined by means of the theory of disturbances and then the relaxation time can be determined by means of the collision integral. Comparison of the obtained results indicates that processes of interaction of spin waves with lattice oscillations play a fundamental role in establishing equilibrium in antiferromagnetics, whilst for ferromagnetics the collisions of the spin waves play the main role. Acknowledgments are expressed to A. I. Akhiezer and M. I. Kaganov for their evaluation of the results of the work.

Card 2/2

SUBMITTED: November 1, 1956.

ASSOCIATION: Physico-Technical Institute Ac.Sc. Ukraine.  
(Fiziki-Tekhnicheskii Institut AN USSR).

AVAILABLE: Library of Congress



AUTHORS: Kaganov, M. I. and Tsukernik, V. M. 126-5-3-28/31  
TITLE: The Thermodynamics of the Ferromagnetic State at Low  
Temperatures (K termodinamike ferromagnitnogo sostoyaniya  
pri nizkikh temperaturakh)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1957, Vol 5, Nr 3,  
pp 561-3 (USSR)

ABSTRACT: The paper commences with a discussion of the thermal capacity of a metal at low temperatures, and of the extra term to be inserted for ferromagnetic metals. The effects of an external magnetic field on the various components (spin, electronic) of the thermal capacity is discussed, in relation to a method of determining the magnetic part of the thermal capacity by measuring in strong magnetic fields, in which the thermodynamic potential has to be deduced. The second section of the paper deals with this deduction for spin waves, following earlier treatments by Holstein and Herring (Refs.3 and 4). Eq.(2) gives the spin wave energy. The thermodynamic potential is equated to the free energy for spin waves, and the rest of the development is straightforward. Two cases (weak and strong magnetic fields respectively) are considered in turn, each being subdivided (Eqs.7-10). No comparison

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The Thermodynamics of the Ferromagnetic State at Low Temperatures 126-5-3-28/31  
is made with experiment, as no suitable data are available. Acknowledgments are made to L. D. Landau, A. I. Akhiezer and V. G. Bar'yakhtar. The paper contains 13 equations, 10 of which are numbered. There are 8 references, 2 of which are Soviet, 5 English, 1 German.

ASSOCIATION: Physico-Technical Institute Ac.Sc. Ukrainian SSR  
(Fiziko-tekhnicheskiy institut AN Ukr. SSR)

1. Metals--Thermodynamic properties
2. Metals--Temperature factors
3. Metals--Magnetic factors
4. Nuclear spins

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76-10-12/34

TSUKERNIK, V.M.

AUTHORS:

Kadaner, L.I., Tsukernik, V.M.

TITLE:

The Distribution of Current on Parallel Plane Electrodes in a Rectangular Electrolyzer (Raspredeleniye toka na ploskikh parallel'nykh elektrodakh v pryamougol'nom elektrolizere)

PERIODICAL:

Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 10, pp. 2253 - 2259 (USSR)

ABSTRACT:

Referring to the papers of one of the authors (Kadaner) in Zhurnal Fizicheskoy Khimii, 1956, Vol. 30, pp. 1560 and 1760, a precise method for the computation of the current distribution for the case of parallel electrodes with finite dimensions which are in electrolyte with non conducting walls is given. It is shown that in the case of sufficiently great distances between the electrodes and small polarization of the electrodes (in acid copper- or zinc electrolytes, in electrolytes for chrome- and nickel plating) the actual current density distribution will differ only to a small extent from the calculated one and therefore the calculation data can be immediately used for the election of the optimum geometric parameters of the electrolyzers. Finally the computation of the current distribution is carried out with tak-

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The Distribution of Current on Parallel Plane Electrodes in a Rectangular Electrolyzer

ing into account of the polarization. There are 5 figures, 1 table, 5 Slavic references.

ASSOCIATION: Institute for Soviet Trade, Khar'kov  
(Institut sovetskoy trgovli, Khar'kov)

SUBMITTED: July 12, 1956

AVAILABLE: Library of Congress

Card 2/2

TsukERNIK V M

56-1-16/56

AUTHORS: Kaganov, M. I. , Tsukernik, V. M.

TITLE: Contribution to the Theory of Antiferromagnetism at Low Temperatures (K teorii antiferromagnetizma pri nizkikh temperaturakh)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 1, pp. 106 - 109 (USSR)

ABSTRACT: It is demonstrated in the present work that the energy spectrum of antiferromagnetics and therefore also all their thermodynamic properties can be obtained in phenomenological way only from the assumption of two or more sublattices. On this occasion the demand of nominal magnetization of every sublattice in the ground state is not necessary. The assumption of the existence of two or more sublattices can be reduced to the assumption that the state of the antiferromagnetics is characterized by the assumption of two or more magnetic moments  $M_i(\vec{r})$  at each point. Moreover, for reasons of simplicity, the authors consider an antiferromagnetic substance to consist of two

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Contribution to the Theory of Antiferromagnetism at Low Temperatures

sublattices with the magnetic moments  $\vec{M}_1(\vec{r})$  and  $\vec{M}_2(\vec{r})$ . This observational method is obviously suited for uniaxial antiferromagnetics. First the Hamiltonian of the system is written down. The magnetic field  $\vec{H}$  should be composed of the outer, constant, homogeneous magnetic field  $\vec{H}_0$  and of the magnetic field  $\vec{h}$  of the spin waves. Then the equation for the motion of the magnetic moments is written down. By using a system of equations given here, the magnetic branch of the energy spectrum of the antiferromagnetic substance near the ground state can be determined. For this purpose the mentioned system of equations is linearized. In the case of an antiferromagnetic the proper magnetic field of the spin waves never changes the dispersion law. Then, the spin proportion of heat capacity of the antiferromagnetic is determined according to the usual formulae of statistical physics. In order to determine the temperature of magnetic susceptibility the energy spectrum of the antiferromagnetic in a magnetic field in vertical position to the axis of easiest magnetizability in particular must be known. For this case the energy spectrum is also ascertained by using the linearized equations of motion. Of course, the temperature dependences

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of heat capacity and magnetic susceptibility found here agree with the analogous expressions found earlier by L. Néel (Neyel') (reference 1). The more complicated magnetic structures, in particular of such ferrites in the case of which magnetic moments of sublattices do not compensate, can be investigated in an analogous way. There are 8 references, 4 of which are Slavic.

ASSOCIATION: Physical Technical Institute AN Ukrainian SSR  
(Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR)

SUBMITTED: July 8, 1957

AVAILABLE: Library of Congress

Card 3/3

*Tsukernik V. M.*

56-2-44/51

AUTHORS: Kaganov, M. I. , Tsukernik, V. M.

TITLE: The Magnetic Susceptibility of an One-Axis Antiferromagnetic Substance (Magnitnaya vospriimchivost' odnoosnogo antiferromagnetika)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol. 34, Nr 2, pp. 524 - 525 (USSR)

ABSTRACT: Many authors (reference 1) make use of the conceptions on the precession of the magnetic moments of sublattices and the high-frequency susceptibility of an antiferromagnetic substance. But they do not take into account the relaxation processes. Here the authors take into account the relaxation processes in the sense of the equation of Landau and Lifshits (reference 2) and connect the constants entering the phenomenological equations for the motion of magnetic moments with quantities which can be observed experimentally (static magnetic susceptibility, resonance frequency, width of antiferromagnetic resonance). For reasons of simplicity

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# The Magnetic Susceptibility of an One-Axis Antiferromagnetic Substance

the authors here investigated an one-axis ferromagnetic substance. First the equation for the magnetic moment for each of the two sublattices is given. When an external field is lacking (which is assumed as being at right angles to the outer axis of the antiferromagnetic substance) the magnetic moments of the sublattices are reversely equal to one another:  $\vec{M}_1 = \vec{M}$ ,  $\vec{M}_2 = -\vec{M}$ . The magnetic alternating field  $\vec{H} = H_0 e^{-i\omega t}$  is regarded as small and the equations of motion mentioned above are linearized. Then the expressions for the Bohr magneton and for the magnetic susceptibility are deduced. This susceptibility  $\chi_1(\omega)$  does not contain any gyrotropy; the rotation of the moments of sublattices takes place in such a way that the total magnetic moment has the same direction as the magnetic field. This does, however, not apply for a strong magnetic field applied to the sample, because then  $M_1(\vec{H}_0) \neq -M_2(\vec{H}_0)$  holds. The width of line  $\Gamma$  is not only determined by the relativistic effects but also by the energy of exchange interaction. When the antiferromagnetic substance is a metal the exchange interaction leads to an additional widening of the line because

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The Magnetic Susceptibility of an One-Axis Antiferromagnetic Substance

of the inhomogeneity of the magnetic moments. There are  
5 references, 1 of which is Slavic.

SUBMITTED: November 26, 1957

AVAILABLE: Library of Congress

1. Magnet moments-Motion-Analysis

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AUTHORS: Kaganov, M. I., Tsukernik, V. M. SOV/56-34-6-30/51

TITLE: A Contribution to the Phenomenological Theory of Kinetic Processes in Ferromagnetic Dielectrics (K fenomenologicheskoy teorii kineticheskikh protsessov v ferromagnitnykh dielektrikakh) I. The Relaxation in the Gas of the Spin Waves (I. Relaksatsiya v gaze spinovykh voln)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 6, pp. 1610-1618 (USSR)

ABSTRACT: This paper investigates the relaxation processes in ferromagnetica with an interaction of the spin waves one with another. In contrast to a paper of Akhiezer (Ref 1), this investigation is carried out without assuming the nominal magnetization of the ferromagnetic in the ground state. The relaxation processes in a ferromagnetic do not only consist of the interactions within the spin system, but the spin waves also interact with the lattice vibrations. But in some cases the interactions between the spin waves play the principal rôle in establishing the equilibrium. For the investigation of the kinetic processes in ferromagnetica it is necessary to know the energy spectrum and also the wave func-

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A Contribution to the Phenomenological Theory of Kinetic Processes in Ferromagnetic Dielectrics. I. The Relaxation in the Gas of the Spin Waves

SOV/56-34-6-30/51

tions of the spin waves, The probabilities of the transitions between the various states of the system may be calculated by means of these wave functions. The authors calculate in a consequent quantum mechanical way the energy levels of the ferromagnetic which are connected with the motion of the magnetic moment. In these calculations the strong exchange interactions and the small relativistic corrections (anisotropy energy and magnetic interaction) are taken into account. The calculations are discussed step by step. The second part of this paper deals with the interaction of the spin waves one with another. The terms of the third and of the fourth order with respect to certain operators  $a$  and  $a^*$  play the principal rôle in these interaction processes of the spin waves. First the case of high temperatures is discussed and then follow the calculations for low temperatures. At last the relaxation time which corresponds to the exchange interaction is calculated. For  $T \gg \Theta_c^2 / \Theta_c$  ( $\Theta_c$  denotes the Debye (Debye) temperature) the interactions of the spin waves with the phonons play the essential rôle. The authors thank A. I.

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